

To: California Climate Action Team and California Air Resources Board

From: Professor Robert Stavins, Harvard University; and Judson Jaffe, Analysis Group

Date: October 2, 2007

Re: Comments on the Updated Macroeconomic Analysis of Climate Strategies Presented in the March 2006 Climate Action Team Report, Dated September 7, 2007

In March 2006, the Climate Action Team (CAT) released a macroeconomic analysis of several potential strategies to reduce California's greenhouse gas (GHG) emissions.¹ Earlier this year, we published a study identifying numerous problems with the CAT's analysis that led it to overstate the total emission reductions and understate the total costs of the examined strategies.²

On September 7, 2007, the CAT released an updated analysis of many of the strategies that were examined in the March 2006 report.³ In this updated report, emission reductions attributable to the examined strategies were reduced by 30 percent. Also, for those strategies for which cost estimates were provided in both reports, estimated net cost savings in 2020 were reduced by nearly \$2 billion.

These significant changes occurred despite the fact that the CAT did not update its estimate of the impact of the vehicle climate change standards, which account for 80 percent of the net cost savings estimated in Exhibit 11 of the updated report. The CAT's updated report states that cost estimates for those vehicle standards were not updated because the standards have already been adopted. This is not a compelling argument for not correcting those estimates, but it does suggest that the standards' impacts should be included in *both* the baseline scenario and the policy scenarios examined in the CAT's report — not just in the policy scenarios, as is currently the case in the CAT's report. By doing this, the CAT's report would then appropriately focus on the incremental effect of only those remaining strategies for which implementation decisions still need to be made.

The updated macroeconomic analysis reflects many analytical improvements. It also represents the beginning of the state's efforts to analyze quantitatively the impacts of a GHG cap-and-trade system, which we believe will be essential to achieve the state's emissions target, and to do so cost-effectively. Unfortunately, it is also clear that the updated analysis has not addressed certain significant problems that we and others previously identified in the original analysis.

¹ California Climate Action Team, *Climate Action Team Report to Governor Schwarzenegger and the Legislature*, March 2006.

² Robert Stavins, Judson Jaffe, and Todd Schatzki, "Too Good to Be True? An Examination of Three Economic Assessments of California Climate Change Policy." Washington, D.C.: AEI-Brookings Joint Center for Regulatory Studies, Related Publication 07-01 (January 2007).

³ California Climate Action Team, *Updated Macroeconomic Analysis of Climate Strategies Presented in the March 2006 Climate Action Team Report*, September 2007.

However, rather than focus on these specific shortcomings, below we discuss a broader issue highlighted by the updated analysis that the CAT and the California Air Resources Board (CARB) should carefully consider in undertaking further analyses in support of the implementation of the Global Warming Solutions Act of 2006 (“the Act”).⁴

A Different Analytical Focus Is Required to Support Policy Design Decisions

The CAT’s first macroeconomic analysis was released prior to the Act’s passage. Thus, at the time that the analysis was released, much of the policy debate focused on the aggregate cost of meeting the emissions targets that ultimately were incorporated in the Act. In turn, the focus of the CAT’s analysis reflected the importance of questions about aggregate costs in the policy debate.

However, given that the Act is now law, we believe that it is now important for California to focus on identifying how to design policy to minimize the costs of meeting California’s target, rather than debating what those costs might be. While the CAT’s macroeconomic analyses provide some insights relating to policy design, as we describe below, a shift in the focus of the CAT’s (and CARB’s) analyses will be required to better address questions relating to designing policy to minimize costs.

In developing regulations to implement the Act, CARB faces two related but distinct tasks:

- Identifying what emission sources and sinks should be targeted in seeking the statewide reductions in net emissions necessary to meet California’s 2020 target
- Identifying what policy instrument(s) should be employed to achieve the desired reductions in net emissions from a given source or group of sources

Assessments of the cost of emission reductions or sequestration like those contained in the CAT’s report can play a role in informing CARB’s decisions regarding what sources and sinks should be targeted by policy. In particular, reductions in net emissions from some sources and sinks, such as forestry and agricultural, can be achieved only through the development of carefully tailored policies that may be costly to implement, and whose success is uncertain. Therefore, as a threshold matter, it is useful to gauge whether the costs of net emission reductions from those sources appear sufficiently low as to make policy development efforts worthwhile. The CAT’s report can help inform those initial assessments.

However, there is little debate that policies are needed to reduce emissions from most emissions sources in California. For example, it is clear that any successful effort to meet California’s 2020 target will need to reduce electricity use and reduce the emissions intensity of electricity generation.

For the many emissions sources that clearly need to be targeted by policy, the important question is *not* what the cost of a particular policy (or set of policies) will be, which is the CAT report’s focus. Rather, the key question that needs to be addressed is whether a given policy

⁴ Our comments are limited in scope, and our silence on various aspects of the CAT’s updated analysis should not be considered to be an indication that we agree with the methodologies employed by the analysis, or with the findings of the analysis.

offers the least costly means of achieving emission reductions from a particular source, *compared* with alternative policy approaches. To address this question and provide insights that can inform policymaking, future analyses should *focus on comparing the cost of alternative policies* that could be employed to achieve emission reductions from particular sources.

Estimates of the ultimate cost of any given policy invariably will turn out to be wrong. Not only is it possible that analytical errors may be made in estimating costs, but even the best estimates are subject to significant uncertainty. Indeed, the updated CAT report highlights the significant uncertainty that exists regarding policy costs. For example, for five of the strategies examined in the CAT's updated analysis, estimates of the average net cost per ton of CO₂ reduced were more than \$100 higher than in the CAT's original analysis. Moreover, the updated report appropriately acknowledges that estimates of the emission reductions that will be realized by the examined strategies could be off by 50 percent or more. This is not a critique of the CAT's analytical capabilities, but rather a reflection of the difficulty of estimating the impacts of climate policy, and the inevitable uncertainty associated with any estimates that are produced.

Despite significant uncertainties about any given policy's *absolute* costs, analyses can offer valuable insight regarding the *relative* cost of alternative policies that could be used to reduce emissions from particular sources. Such analyses are essential for guiding the policymaking decisions that lie ahead. In particular, with respect to more than 80 percent of California's emissions, the critical question that California faces is regarding the appropriate balance between employing a cap-and-trade system and relying on other regulatory interventions, such as efficiency standards and other sector- and source-specific policies. More analysis can and should be done to inform policymakers regarding the balance between the two approaches that will minimize costs.

Analyses that will inform policymakers regarding the appropriate balance between reliance on a cap-and-trade system and use of other regulatory interventions require a fundamentally different focus than that present in the CAT's report. The need for this different focus is made apparent by considering the conditions under which a cap-and-trade system would be less costly than other regulatory interventions, and *vice versa*. We describe these conditions below.

In most cases, it is reasonable to presume that a cap-and-trade system will achieve GHG emission reductions at less cost than other regulatory interventions — such as efficiency or emissions standards — that could target the same sectors or sources. This fact is widely recognized by economists and policy analysts. The primary reason why a cap-and-trade system is less costly is that, rather than requiring certain actions that may or may not turn out to be cost-effective, it creates an incentive (the allowance price) that adjusts to ensure that an aggregate emissions target is met, but allows regulated sources the flexibility to identify and implement the least costly means of achieving that target. Also, a cap-and-trade system can elicit some potentially low-cost emission reductions that standards simply cannot target — such as those associated with changes in the use of emissions-generating or energy-consuming equipment.

If particular measures that standards could require are, in fact, cost-effective emission reduction opportunities, it is typically the case that they will be undertaken under a cap-and-trade system even in the absence of such standards. This is because regulated sources have an incentive to undertake the least costly means of achieving the mandated emissions cap.

Relative to a cap-and-trade system, standards have a number of undesirable characteristics that are widely recognized by economists and policy analysts. For example, standards typically need to be applied as uniform requirements for all firms or households that use the regulated equipment. Yet, these firms or households often differ to a significant degree in the extent to which they use the regulated equipment, as well as how they use that equipment. Therefore, while the uniform standards may yield cost-effective emission reductions from some regulated entities, those reductions likely will come at the cost of requiring emission reductions that are much more costly for other regulated entities. Moreover, standards can lead to perverse and unintended consequences. For example, standards can delay replacement of regulated equipment with new, more efficient models by increasing the cost of new models without otherwise changing the incentives that firms or households have to replace their existing equipment with the new models.

It is only when there are so-called market failures present that standards may achieve specific low-cost emission reductions that would not be achieved under a cap-and-trade system.⁵ These market failures can introduce obstacles to the adoption of some cost-effective emission reductions that may not necessarily be overcome by the incentives introduced by a cap-and-trade system. Common examples of such market failures include the possibility that consumers have inadequate information about future energy savings from energy-efficiency improvements, and the “landlord-tenant problem,” whereby landlords must finance energy-efficiency investments, but may lack the incentive to do so because their tenants pay the utility bills. However, there is a substantial and unresolved debate about how significant these market failures are, and some analyses suggesting that such market failures prevent the adoption of seemingly cost-effective emission reduction measures may simply underestimate the true cost of those measures.

While there is a substantial debate about the overall significance of such market failures, it is clear that very careful case-specific analysis is required to evaluate whether such market failures are present in a particular circumstance, and whether they are sufficiently large to support adoption of standards instead of, or in addition to, reliance on a cap-and-trade system. Such analyses have thus far been absent in the CAT’s report. Therefore, future analyses of many of the strategies examined in the CAT’s reports should focus less on assessing the strategies’ absolute costs and the macroeconomic impacts of those costs, and more on assessing whether their costs can be expected to be less than or greater than the costs of achieving comparable emission reductions from the same sources under a cap-and-trade system.⁶ These assessments will offer much more valuable input to policymakers than assessments of the absolute costs of individual policies or sets of policies.

⁵ See Stavins, Jaffe, and Schatzki (2007).

⁶ Also, if a cap-and-trade system is adopted, as is assumed in the CAT’s updated analysis, this system will affect electricity prices. If the cap-and-trade system is economy-wide in scope, it also will affect the price of natural gas and petroleum products. In turn, this will lead firms and households to adopt some of the measures that are targeted by the other emission reduction strategies even in the absence of those strategies. Thus, the incremental impact of the strategies will be affected by the presence of the cap-and-trade system. It is not clear whether the CAT report accounted for this in assessing the incremental impacts of the various strategies that it examined, but future analyses must do this when evaluating the merits of adopting other policies in addition to a cap-and-trade system.

Additional Comments on the CAT's Updated Macroeconomic Analysis

As the CAT report acknowledges, much more work needs to be done to examine the impacts of a cap-and-trade system, and of alternative designs of such a system. However, we would like to address briefly some insights from the results of the CAT's preliminary analyses.

One implicit conclusion of the CAT's analyses should be emphasized: only a cap-and-trade system is capable of guaranteeing achievement of California's 2020 emissions target. Not only does the CAT report find that the estimated reductions from the other strategies it examines fall short of achieving the 2020 target, but, more importantly, the CAT report acknowledges that these other strategies cannot provide a guarantee of achieving any given emissions target in the same way that a cap-and-trade system can.

As an indicator of the most costly emission reductions necessary to achieve California's 2020 target, the emissions allowance prices under the different scenarios presented in Exhibit 22 of the CAT report offer several other important insights.

First, the comparison of a scenario in which the cap-and-trade system is economy-wide in its coverage to one in which that system is limited to covering major stationary emission sources reveals that the latter, more limited approach could increase the cost of emission reductions achieved under the cap by nearly a factor of four. While the precise cost impact of such a more limited scope of coverage is uncertain, the CAT analysis usefully highlights that a more limited scope of coverage could significantly increase costs.

Second, the CAT's preliminary analyses highlight the potential value of emission reduction offsets in reducing the cost of achieving an emissions target under a cap-and-trade.

Third, the CAT's preliminary analyses highlight the significance of just one of the many sources of uncertainty regarding the cost of achieving California's emissions target — the amount of emission reductions necessary to meet an emissions cap. For example, the BEAR model found that, if the effectiveness of other regulations in achieving emission reductions is less than anticipated, the cost of the remaining reductions necessary to achieve California's statewide target could increase by more than a factor of ten. Thus, in considering alternative policy designs, policymakers need to carefully consider provisions that can protect against unexpectedly, and potentially unacceptably high costs.

Summary

The context in which the CAT's work is being done has changed significantly since its original report was released in March 2006. The key question is no longer what the aggregate cost of achieving California's 2020 emissions target will be, but rather how to design policy to minimize that cost.

In turn, this calls for a shift in the focus of analyses of potential climate policy. For most of California's emissions sources, it is clear that they will need to be targeted by a cap-and-trade system, by other regulatory interventions, or by both. To provide policymakers the insight necessary to make an informed choice among these approaches, analyses need to focus on critically evaluating the relative cost of alternative policies for achieving emission reductions.